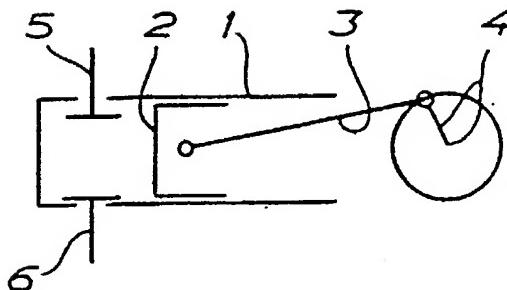




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(54) Title: NON-COMPRESSION INTERNAL-COMBUSTION ENGINE



(57) Abstract

A method of operating a three-stroke internal combustion engine having a cylinder (1) and a piston (2) reciprocable in said cylinder, said piston having a crank rod (3) pivoted to the piston, the opposite end of the crank rod being rotatably mounted to a crank shaft (4) to be rotated under the influence of the reciprocating movement of the piston. The operating cycle of the engine comprises a suction stroke, an expansion stroke and an exhaust stroke. According to the invention, the suction stroke extends over a fraction only of the total stroke of the piston, an instant ignition of the fuel mixture sucked into the cylinder then being effected. The following expansion is effective during the remaining portion of the movement of the piston towards the lower end position in the cylinder.

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## NON-COMPRESSION INTERNAL-COMBUSTION ENGINE

The present invention relates to a three-stroke compound engine of internal combustion type.

5       The purpose of the invention is to provide an internal combustion engine which is less power-consuming than engines known so far and which can be operated by mixtures of gasoline and alcohol or the like. A further purpose of the invention is to provide  
10      an internal combustion engine which for a desired output can be made smaller than conventional engines and which can be manufactured at lower costs.

The purposes mentioned above are achieved by the invention defined in the claim.

15      The invention will be described below with reference to the accompanying drawing in which

FIG. 1 illustrates diagrammatically the suction stroke of the engine,

FIG. 2 illustrates diagrammatically the expansion stroke of the engine, and

FIG. 3 illustrates diagrammatically the exhaust stroke of the engine.

The principles of the engine are illustrated in the figures which show a cylinder 1 and a piston 2 reciprocable therein, said piston having a crank rod 3 pivoted to the piston at one end thereof. The other end of the crank rod is rotatably mounted to the crank of a crank shaft 4 for converting the reciprocating movement of the piston to a rotational movement of the crank shaft. In the cylinder head there are provided an inlet or suction valve 5 and an outlet or exhaust valve 6 which are controlled so as to be opened and closed by means not shown in the figures.

FIG. 1 illustrates the suction stroke of the engine.  
35      During this stroke the inlet valve 5 is open while the



- piston is moving to the right as seen in the figure. The valve opening is dimensioned so that the total amount of fuel or fuel mixture required for the combustion during the following expansion stroke, will 5 be sucked into the cylinder during a movement of the piston 2 comprising a fraction only of the total stroke of the piston. Then, the valve is rapidly closed, the fuel mixture sucked into the cylinder at the same time being instantly ignited.
- 10 The expansion obtained during the following combustion causes the piston 2 to continue the movement to the right over the remaining portion of the total stroke of the piston, the crank shaft 4 accordingly being rotated.
- 15 When the piston 2 has reached the right hand end position in the cylinder, the outlet valve 6 will be opened. The moving direction of the piston will be reversed by the continued rotational movement of the crank shaft 4, and during movement of the piston 2 to 20 the left the exhaust gases will be expelled through the outlet valve 6. When the piston has reached the left hand end position thereof, the outlet valve 6 will be closed and at the same time the inlet valve 5 will be opened. Then, the cycle described above will be repeated.
- 25 As will be gathered from the description above, the engine operates without any compression of the fuel mixture; the only pressure increase obtained is that which is due to the combustion of the fuel.
- To the crank shaft, two or more cylinder piston 30 units of the kind described can be connected such that the crank shaft at any time is rotated under the influence of the piston movement in one of the cylinders.

## CLAIM

Method of operating a three-stroke internal combustion engine having a cylinder (1) and a piston (2) reciprocable in said cylinder, said piston having a crank rod (3) pivoted to the piston, the opposite end of the crank rod being rotatably mounted to a crank shaft (4) to be rotated under the influence of the reciprocating movement of the piston, the operating cycle of the engine comprising a suction stroke, an expansion stroke and an exhaust stroke, characterized in that the suction stroke extends over a fraction only of the total stroke of the piston, an instant ignition of the fuel mixture sucked into the cylinder then being effected and the following expansion being effective during the remaining portion of the movement of the piston towards the lower end position thereof in the cylinder.

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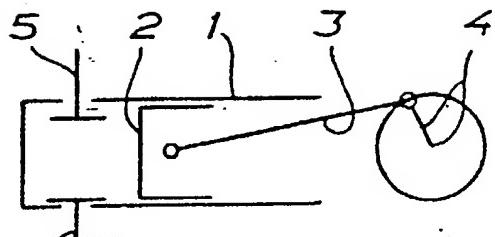


FIG. 1

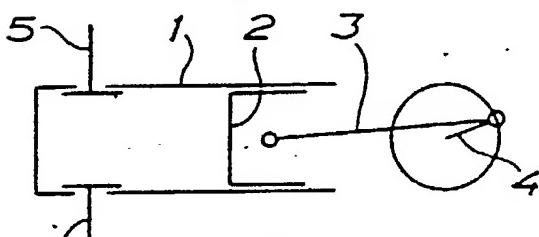


FIG. 2

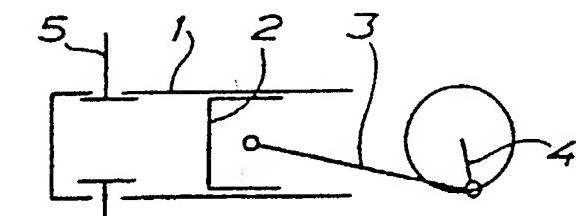


FIG. 3

SUBSTITUTE SHEET



# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE82/00231

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) \*

According to International Patent Classification (IPC) or to both National Classification and IPC 3

F 02 B 41/00

## II. FIELDS SEARCHED

Minimum Documentation Searched \*

Classification System	Classification Symbols
IPC 3	F 02 B 41/00-41/08
National Cl	46a:1-15
US Cl	123:38-39

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched \*

SE, NO, DK, FI classes as above

## III. DOCUMENTS CONSIDERED TO BE RELEVANT \*\*

Category *	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. 18
X	"OELMASCHINEN, WISSENSCHAFTLICHE UND PRAKTIISCHE GRUNDLAGE FÜR BAU UND BETRIEB DER VERBRENNUNGSMASCHINEN", VON ST. LÖFFLER, A. HEIDEL SPRINGER VERLAG BERLIN 1916 SEITE 3-4, "DIE FEURMASCHINE VON LENOIR (1860)".	
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## IV. CERTIFICATION

Date of the Actual Completion of the International Search \*

1982-10-07

International Searching Authority \*

Swedish Patent Office

Date of Mailing of this International Search Report \*

1982-10-07

Signature of Authorized Officer \*

Kristian Sanderson

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ABSTRACT:

CHG DATE=19990617 STATUS=O>A method of operating a three-stroke internal combustion engine having a cylinder (1) and a piston (2) reciprocable in said cylinder, said piston having a crank rod (3) pivoted to the piston, the opposite end of the crank rod being rotatably mounted to a crank shaft (4) to be rotated under the influence of the reciprocating movement of the piston. The operating cycle of the engine comprises a suction stroke, an expansion stroke and an exhaust stroke. According to the invention, the suction stroke extends over a fraction only of the total stroke of the piston, an instant ignition of the fuel mixture sucked into the cylinder then being effected. The following expansion is effective during the remaining portion of the movement of the piston towards the lower end position in the cylinder.